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ABSTRACT

As part of a two-year project that examined the processes by which children initially approach the reading task, a study was devised to test the project's materials and procedures. Selected by a pretest, four kindergarten children, with no prior reading instruction, were taught the same reading content using the initial teaching alphabet for a 20-week period. Two children were instructed according to a whole-to-part program requiring a sight vocabulary of meaningful words, and the other two children were taught according to a part-to-whole program using equivalents of letters and letter combinations. Based on the children's answers to probe questions, their spontaneous comments, and their responses to tasks, the preliminary study revealed that decoding and comprehension are not separable in most children's minds, in that children try to impose structure and elicit meaning from tasks and expect to find language meaning in the printed word. (MAI)

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A PRELIMINARY REPORT

OF THE

EARLY DECODING STRATEGIES PROJECT*

1975

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Preliminary Report

of the

Early Decoding Strategies Project

Many psychological and sociological characteristics have been correlated with reading achievement (Hardy, 1973; Weintraub, Robinson, Smith, Plessas, and Rowls, 1974-1975). However, little is known about the way in which these characteristics influence the process of learning to decode written material. Only a small number of studies have attempted to examine the processes through which learners develop basic decoding skills (Bishop, 1964; Gibson, Gibson and Levin, 1964; Samuels, 1967). Little is known about children's behavior during the process of developing a generalizable decoding strategy which will enable them to translate groupings of printed symbols into linguistically meaningful units.

The requisites for arriving at a decoding strategy have been relatively well identified (Belmont, 1974; Marchbanks & Levin, 1965). The child must 1) learn to discriminate among letter shapes, 2) associate each shape or group of shapes with an auditory equivalent, and 3) analyze "accurately the visual and auditory structures of words . . . . and synthesize or blend phonetic units to form complete words (Vernon, 1957, p. 71)." The order in which these competencies are acquired may differ with the teaching approach, but all of them must be acquired before fluent decoding can occur.

The development of these essential skills may be affected by a variety of structural and contextual variables. For example, the degree of difference or similarity between letter shapes will lead to more or less confusion in discrimination (Gibson, Gibson, Pick, Osser, 1962; Guralnick, 1972; Samuels & Jeffrey, 1966). The linguistic or pictorial context in which words are placed may also provide cues (or miscues) to the beginning

reader (Duell, 1968; Kiraly & Furlong, 1974; Samuels, 1967). The cues in syntactic and semantic context have been stressed by linguists interested in the acquisition of reading skills (Goodman, 1968).

While information is available on the status variables correlated with reading success, on the skills necessary for the development of a decoding strategy and on the variables which affect these skills; little is known about children's behavior during the process of constructing decoding strategy.

The purpose of this project was to provide detailed descriptive information on what children do in dealing with beginning reading tasks, and to map the various ways in which they evolve decoding strategies under exposure to different modes of presentation: part-to-whole (P-W), and whole-to-part (W-P).

These two modes correspond to two common teaching methods: part-to-whole is similar to the "phonic" method, and the whole-to-part is similar to the "whole-word" method. Although different textbooks or teacher-made materials tend to emphasize one or another of these approaches, neither is too often found in its pure form in the classroom. However, for research purposes the two approaches were developed to allow for as little overlap as possible.

Both approaches, to be effective, must result in a fluent decoding strategy, and therefore can be assessed against a common standard of decoding mastery. However, the behavior required of the learner differs in the two modes. The part-to-whole approach provides the child with the units to be synthesized, and then requires him to make the synthesis. The whole-to-part approach requires extra steps since the learner must first analyse the

whole into its component parts, transfer the sound equivalents to a new context and then resynthesize them. The experimental separation of these two modes permits closer analysis of two component skills-synthesis and analysis in beginning reading.

In the materials developed for the project, the initial teaching alphabet (i/t/a) was used for two reasons. First, since i/t/a has greater regularity of sound-symbol correspondence than traditional orthography (t/o), the use of i/t/a facilitated the assessment of the synthesis-analysis process. Although the argument has been made that an early recognition of the irregularities in English facilitates the acquisition of reading skills in traditional orthography (Gibson, 1965), the existence of gross irregularities in sound-symbol relationships poses problems for the beginning reader which could mask the procedures by which he arrives at a decoding strategy. Secondly, the use of i/t/a made it possible to introduce the same letters and sounds in the same order in both approaches without violating meaningfulness and familiarity in the W-P mode or forcing the use of complex combinations in the P-W mode.

In order to observe the development of decoding strategies, kindergarten children who had had no prior formal reading instruction were studied in the process of acquiring beginning reading skills. In addition to mapping the actual processes used by the children, the project was interested in the following questions:

1. To what extent will the process of developing decoding strategies be idiosyncratic and to what extent will there be common patterns?
2. Will the form of the reading information which is presented affect the development of these processes differentially?

3. In which ways will the individual child's prior information and learning style interact with the methods of presentation of reading information?

METHOD

Selection of Subjects

In order to obtain information concerning the processes by which children initially address themselves to the reading task, subjects had to be identified who (a) had had no prior exposure to formal reading instruction and little or no knowledge of reading, (b) were apparently free from learning disabilities, and (c) were sufficiently verbal to be able and willing to respond expansively to the examiner's questions.

The available funds for the project precluded involving more than two people who would be able to work with the children. Since it was essential that the selected subjects be seen frequently, regularly and in a one-to-one relationship with the experimenter, we had to limit the study to four children. A two-step procedure was followed for the selection of the four subjects. First, the kindergarten teacher indicated twelve children who appeared to meet the criteria listed above. These children were individually assessed through a combination of an interview and a specially designed pre-test (see Report on the Pretest for the Early Decoding Strategies Project). In addition, the Peabody Picture Vocabulary was administered in order to eliminate those children who had unusually high or low verbal-ability scores. The four children, two boys and two girls, who best met the criteria were selected.

Pre-test

The test was constructed to probe the following areas:

1. The ability to read, write or assemble own name from printed letters.
2. Knowledge of conventional names for lower-case letters.
3. Isolation of initial phonemes (consonants and vowels).
4. Selection of a lower-case letter to represent the initial phoneme of a spoken word (association of phoneme to grapheme).
5. Reading a selected list of words (six meaningful consonant-vowel-consonant trigrams, and two sight words).
6. Reading ten words, randomly chosen from Durkin's list (1966) and any other words the child indicated that he/she knew.
7. Reading a set of sentences composed of words from subtest six.

Throughout the administration of this measure, children's responses were probed by the examiner by questions such as, "How do you know? How did you learn that? What else can you tell me?" This combination of probing and test administration yielded quantifiable and descriptive information.

Selection of Subject and Assignment to Instructional Mode

Although all of the children could write their names and none of them were able to read words or sentences, they represented a considerable range of performance on letter naming, isolating phonemes and identifying letters to correspond to initial phonemes of spoken words. Their assignment to the P-W or W-P treatment was based on their performance on the pretest and on information on individual learning styles resulting from the interview. Theresa and Paul were assigned to the W-P treatment, Jennifer and Alex to

the P-W treatment. A brief description of the four children follows:

Theresa (5 years, 3 months, Peabody IQ 96) had little knowledge of letter names, correctly identifying only x and o, mistakenly rhymed (apple - papple) instead of segmenting first phoneme (apple - /a/), and was unable to match phonemes to graphemes. However, she indicated an ability to learn from direct classroom instruction when she correctly identified the numerals 1 to 5 which had been taught in her class. It was, therefore, judged that the W-P approach would be better suited to her style of learning.

Paul (5 years, 2 months, Peabody IQ 114) had fairly extensive knowledge. He was able to identify 18 letters out of the 26, segment 19 phonemes out of 23 and match 12 of 23 phonemes to graphemes. This made him a candidate for either approach. He was placed in the W-P approach to allow for the examination of how a child might utilize previously acquired phono-graphemic information in a presentation mode which did not emphasize that type of information.

Jennifer (5 years, 3 months, Peabody IQ 111) had uneven knowledge. She was able to name 19 letters but only able to segment 8 of the 23 phonemes and match only 4 of the 23 phonemes to graphemes. She appeared uncertain about the concept "begins with." She was placed in the P-W approach in order to study the process by which a child who had not fully grasped the concept of phonemic segmentation would process part-to-whole information.

Alex (5 years, 2 months, Peabody IQ 100) also had an uneven pattern of information. His strength lay in phonemic segmentation with 18 correct out of 23. He was able to identify only 11 out of 26 letters, and match

8 of the 23 phonemes to graphemes. His placement in the P-W approach provided for a comparison of the learning of two children, given the same instructional approach, whose knowledge of phonemic segmentation differed markedly.

The Two Modes of Presentation

As previously discussed, the development of a consistent and fluent decoding strategy requires the beginning reader to discriminate among printed symbols, to associate an auditory equivalent to each shape or group of shapes, and then to analyze both the structure of the word to be read, and to synthesize (blend) the phonetic units. The order in which these operations are performed depends, in large measure, on the material to which the learner is initially exposed. The two approaches chosen for the presentation material, theoretically, involved the following tasks:

1) In the part-to-whole (P-W) approach, the child must first learn the sound equivalents of letters, followed by the sound equivalents of basic letter combinations. The next step entails the integration of these units of information (blending). This knowledge is then applied to decoding new words and word sequences. In this approach the child must learn to synthesize several sequential units which were initially learned in isolation and without any particular sequence.

2) In the whole-to-part (W-P) approach, the child must first acquire a sight vocabulary of meaningful words. These words give him repeated exposure to the sounds of letters and to letter combinations. As more words are remembered, he has available more instances of consistent sound-symbol relationships. From these, he must eventually infer the sound-equivalents of the discrete units (or combinations) which he can then apply to words

which are not in his sight vocabulary. In this approach, the child must first sort the component parts out of the whole word and then resynthesize them in a new sequence.

Development of Materials

Materials were developed in both modes (P-W, W-P) and were designed to serve both instructional and evaluative purposes. Instructional materials were used to introduce the child to information which he/she had not yet acquired. (E.g., Examiner: This is the word bat.) Evaluative materials were used to test the child's retention of previously presented information, (e.g., Examiner: What does this say -- bat?), and to test the child's ability to generalize to new materials (e.g., Examiner: This is cat, this is bat. What is this word -- cab?).

The programs presented equivalent information, so that, theoretically, learners in both groups would be able to arrive at the same generalizations, and could be assessed against a common standard of decoding mastery. For example, at the first stage of instruction, eight graphemes were selected, six consonants and two vowels. Five of the selected consonants -- c,b,t, g,f, -- are visually dissimilar and can appear in both initial and final positions of monosyllabic words. The consonant h and the vowels a and i were selected because of their frequent occurrence in common monosyllabic words. The selection of these graphemes permitted the development of a sequence for initial instruction in the two modes, consisting of eight phono-graphemes for the P-W children and six "whole" words composed of these same graphemes, for the W-P children.

P-W Phono-Graphemes	W-P Words
/c/c	cat
/a/a	bat
/t/t	hat
/b/b	fat
/h/h	big
/f/f	bag
/i/i	
/g/g	

In addition, the sight words the, is, a were added to both approaches.

When information had been obtained concerning the learning rate of the children and their capacities for making generalizations, the scheme for the second phase of instruction was devised. New materials were made and the following items were introduced.

P-W Phono-Graphemes	W-P Words
/m/ m	can
/n/ n	mee
/p/ p	hee
/s/ s	wee
/ee/ ee	see
/ie/ ie	mie
	biek

The use of i/t/a made it possible to introduce the vowels /ee/ and /ie/ and thus expand the number of words which the child could construct or read. Since both groups were taught is, a, and the, it was possible to construct a variety of simple sentences. There was no set sequence for the introduction of these words.

The materials consisted of the following:

1) A set of construction paper booklets which contained either one word or one grapheme and some appropriate illustration.

2) A set of 3" x 5" cards containing the identical words or graphemes but without illustrations. These were used to assess retention.

3) A set of movable, heavy paper wheels used to test the children's ability to combine words or phono-graphemes. The P-W wheels had three movable parts: the inner and outer circles contained consonants, the middle circle contained vowels. The W-P wheels contained three sets of words: nouns (cat, bat, hat) on the inner circle, adjectives on the intermediate circle (big, fat) and articles (a, the) on the outer circle. In addition to their assessment function, both sets of wheels were occasionally used for instruction.

4) A bingo game with graphemes for the P-W mode, and words for the W-P mode was used to evaluate the child's ability to match a visual pattern to an auditory one.

5) Sentence and word slots were designed to hold some elements constant while allowing the child to manipulate other elements. The word slots with a stationary medial vowel (a, i, ie, oo) were constructed when it appeared that one of the children was unable to grasp the C-V-C pattern necessary for constructing words when given three graphemes. The sentence slots were constructed to assist the children's sentence and question formation. Two examples are : "Is the _____ ___?" and "The _____ is _____."

6) Sentence strips and personalized stories were used to test the retention of previously presented material and to observe children's decoding responses when presented with new material in the context of a limited number of syntactic and semantic cues.

7) "Matching strips" intended for assessing visual discrimination were dropped when it became clear that no child had any difficulty finding the correct visual match for words or phonemes.

Instructional Procedures

Each child was seen two mornings a week for approximately 20 weeks.[1] Sessions lasted, on the average, for twenty minutes but varied somewhat depending on the type of material to be presented, previously scheduled classroom activities, and the child's attentiveness.

The materials were so constructed as to present comparable information to the children in each of the modes. For example, when the word cat was presented to children in the W-P program, the children in the P-W program worked with the phono-graphemes /c/, /a/, /t/. Following each presentation of the material, the child's learning was assessed formally and informally. To test the word cat (W-P) the child was asked to select cat out of an array of visually similar words or visually distinct words. The P-W child was tested for the phono-graphemes either by being asked to select the appropriate grapheme when given a phoneme or by responding with the appropriate phoneme when shown the grapheme. These "present-test -- present-test" procedures allowed the child to progress through the materials at his/her own pace.[2] When the child evidenced fairly consistent knowledge of a word or set of phono-graphemes, new material was introduced.

In order to maintain a continuous record of the children's behavior, each session was audiotaped and an observor took notes. The tapes and

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[1] The number of actual sessions varied considerably from child to child as a result of different absence rates.

[2] In retrospect, as the data are analyzed by moves (one Teacher-Pupil or Pupil-Teacher exchange), it appears that for some of the children the pace was slower than it might have been because considerable time was devoted to testing for generalization and even more to probing questions.

notes were later transcribed by the examiners. Further, once a week the sessions were videotaped. The films were viewed and an edited version was made.

Task Instructions

During the instructional phase, children were asked to respond to specific tasks which were similar to those which might occur in any normal teaching sequence. The instructions were geared to eliciting an active and, wherever possible, a manipulative response from the child.

P-W Tasks:

1. Associate a grapheme with a phoneme.
2. Blend phono-graphemes into pronounceable units.
3. Form pronounceable units by combining individual letters.
4. Spell words composed of previously introduced phono-graphemes.
5. Retain three sight words.
6. Read sentences composed of sight words and words containing previously introduced phono-graphemes.

W-P Tasks:

1. Recognize words presented as wholes.
2. Form words from individual letters.
3. Read sentences composed of presented words.

Probe Questions

Questions intended to probe the child's reasons for and elaborations of their responses were used by Reid (1966) as part of a loosely structured interview technique. Her purpose was "to get the children to talk, and not, in any narrow sense, to obtain information on specific points" (p. 57). The technique was subsequently used by Downing (1970, 1971-72) who confirmed its utility. The probe questions in the present study were constructed to

explore 1) a reason for the child's response (Do you know why . . . .?), 2) a retrospective explanation of how information had been acquired (Do you remember how you learned that?), and 3) specific information (Do you know what _____and _____are?) or (Why do you think its _____?). As the following dialogues demonstrate, these questions yielded a rich source of information.

Reason for Response:

E. Here is a group of words. Can you read them? (The words cat, fat, bat, mat, on separate 3" x 5" cards were presented.)

P. cat, fat, bat, mother

E. This word is mat. Do you know why?

P. It's something that rhymes -- mat and cat. Cat ends with t and mat ends with t.

Here the child demonstrated his understanding of the meaning of rhyming, gave an example of rhyming, and indicated some awareness that the auditory similarity is related to the possession of a common grapheme.

Retrospection:

E. Now, you write the word.

T. Cat, I mean hat. Mommy was right -- rat, hat, rat. Rat can be after hat.

E. What did your mommy tell you?

T. My mommy told me that after you learn hat, you can learn rat.

Here the child reveals an expectation about the learning sequence, one that was initiated by her mother. She seeks confirmation of the accuracy of her expectation.

Information:

E. Find cat and point to it (strip of four words: atc, cat, tca, cta).

T. (Points to atc)

E. Why does this (pointing to atc) say cat?

T. Has the same letters and numbers.

This exemplifies how a child's response to a probing question yielded information about her belief that letter order is inconsequential and that letters and numbers are interchangeable labels.

Preliminary Findings

The full analysis of the data will include a categorization of instructions, responses, elaborations, error patterns, evidence of generalization, and the types of cues used in the decoding process. Currently, however, a preliminary review of the data revealed cognitive categories which appear to be unique to the beginning reader. These categories were retrospectively evolved based upon 1) the children's answers to the examiner's probe questions, 2) their spontaneous comments during the instructional period, and 3) their responses to the tasks presented to them.

Each of the children responded differently to the task and probe questions. Consequently, the examiners increased the use of those which appeared to be productive and decreased the use of the less productive ones. Theresa rarely gave elaborated responses to probe questions and frequently attempted to divert attention from the reading tasks. As a result, the use of probe questions was diminished and task questions were rephrased as statements (e.g., from "Can you tell me what this is?" to "Tell me what this is."). Paul consistently tried to answer any question, though his answers varied in thoughtfulness. He often volunteered new information that he had acquired outside the experimental situation and this enabled the examiners to ask further probing questions. Alex also enjoyed volunteering information,

and he had a tendency to associate from the presented unit of information to a larger and more meaningful one. This clarified for the examiners his understanding of the material as often as it served to divert him from the task. His continual evaluation of the "sense" or meaningfulness of given information led the examiners to include the question, "Does it make sense?" as a probe. Jennifer, like Alex, seemed concerned with the sense of her reading material and was quick to point out any relationship between what she read and what had happened to her. In response to retrospective questions, she was often able to remember who had taught her something, but not how they had done so. As a result of these differences in style and personality, the data derived from each child occurred during responses to differing questions and conditions.

What follows are impressions from an examination of the tape scripts and videotapes relating to three major categories of responses: 1) the child's beliefs related to readings, 2) the child search for meaning and 3) the uncertainty of knowledge. Although a particular child's responses tended more often to fall in one of the three categories rather than in all of them and while individual expression varied widely, the general categories appeared to be common to the four children.

The Child's Beliefs About Reading

It appears that there is a period prior to direct instruction when children develop their own hypotheses or conceptions concerning reading. This was revealed in responses which occurred predominately during the pre-test and occasionally throughout the year. These responses were generally not related to the instructional tasks but occurred either spontaneously or in response to the examiner's probes. While each of the children showed

evidence of his or her own beliefs about the reading tasks, most of the examples below were drawn from Paul's comments since he was most articulate in voicing his beliers and more often than the other three children volunteered information about his conceptions of the task.

1. The belief that the words "numbers" and "letters" are interchangeable labels.

E. Do you know this letter? (Letter x presented on 3" x 5" card.)

P. Yes, it's x.

E. How do you know?

P. I know my letters and numbers.

E. Is x a letter or a number?

P. A letter.

E. Do you know other letters?

P. Yes, a, b, c, d, -- they're all numbers. Even c can be a number. This type of confusion has been documented with other young children (Downing, 1970, 1971-72). Theresa also gave evidence of this confusion.

E. Find cat and point to it.

T. (Points to atc)

E. Why does this (atc) say cat?

T. Has the same letters and numbers.

2. Belief that reversing directionality of letters does not affect the letter name. Thus, up/down (p-b) or left/right (d-b) directionality were believed to be merely transformed representations of an object. Although Paul, for example, had no difficulty in making visual discriminations or in matching to a standard, b, d, p, and q were viewed as various representations of the object p.

P. This is the letter d. It looks like a p and it is a p.

At the word level, he understood that the letters were grouped horizontally, but believed that the word remained constant whether written left-to-right or right-to-left.

P. This is cat. (Arranges individual letters to form cat.)
I know another way to make cat. (Arranges letters to form tac)
Anything can be cat.

Examples of the irrelevance of order of letters in word naming also appeared frequently in the transcripts of the other three children.

(3) The belief that since words are made up of combinations of letters, any combination of letters can form a word.

P. (Assembling the letters c,b,t,a, and trying to pronounce them.)
What does that spell?

Alex appeared to share this belief as he often arranged letters randomly, and then tried to pronounce them. This behavior, however, came into conflict with his consistent attempts to judge such combinations for their "sense" or meaning.

(4) To Paul, a word represented an idea. When a word was written, it took on the representation of that idea much like an ideograph developed from an object. His belief appeared to be that new words could be generated from the meanings of written words by transforming the arrangement of the letters.

P. (Writing beet up)

E. What did you write?

P. Beet up.

E. How did you know that?

P. Beet has this (points to the letters bee) and /t/ t. I saw "up" on Seven-up. I know another, down, p u is down.

While there were a few other examples of this type of thinking, there were not many and they appeared to be idiosyncratic.

5. Belief that a "wishing it were" would determine the word.

E. What's this? (3" x 5" card with word - bat)

P. Dog?

E. No, it says bat.

P. I wish it could say dog.

Paul frequently asked for words that he preferred - such as dog, rabbit and horse - and this dialogue may have been another form of the same request.

6. The belief that words like objects may be acquired and owned. Jennifer gave most frequent expression to this by such statements as, "These are my favorite words. Where are my words? I can't read this; it's not my word." Paul expressed somewhat the same attitude when he was given a pack of 3" x 5" cards with individual words and asked to read them. Voluntarily he would separate the words into two piles, one that he knew and one that he didn't. This separation into known and unknown words (or mine and not mine) occurred rapidly, without the examiner's request, and occasionally without much accompanying verbalization.

7. Finally, the belief that the words the teacher uses to talk about reading have the same meanings as when used generally. This may be part of the more general cognitive confusion about reading found in many young children (Downing, 1970, 1971; Reid, 1966).

E. Can you tell me what sound cat begins with?

T. Sure, meow!

The Child's Search for Meaning

The personal nature of the instructional setting permitted and encouraged the children to respond freely. As a result the children asked questions concerning the tasks and elaborated upon their own responses. These verbalizations revealed that the children attempted to utilize information presented and/or to find meaning in it.

These comments occurred initially in response to task instructions. As it became clear that meaningfulness was important to the children, probe questions were generated. Specifically, Alex's continual use of "That doesn't make sense" or "That makes sense," led to probes such as "Does that make sense?" or "Have you heard of that?".

While all the children evidenced a search for meaning, Jennifer and Alex appeared most concerned with it. This may have been due in part to the fact that their program (P-W) initially offered few meaningful units. However, even after Jennifer had evolved a "whole-word" strategy for overcoming her inability to blend, she continued to evaluate the meaningfulness of the material. Alex, as previously mentioned, often used his elaborations to divert himself from the experimental tasks. Therefore, even though Jennifer and Alex seemed more concerned than the other two children with the "sense" of the material, this may have been due partly to non-cognitive factors.

The elaborations appeared to fall into two general domains: association and evaluation. While all the children made some associative responses, Alex was the only one who made spontaneous, evaluative ones. However, when probed, the other children also gave some evaluative responses. Examples of the types of elaborations are given on the following page:

Types of Elaboration	Responses
1. Association to a larger unit.	
a. From letter to word	E. What is this (d)? T. d is for dog.
b. From syllable to word	E. Can you tell me how umbrella begins? J. Yes, /un/ like in onion.
c. From word to phrase	E. Can you put /a/ and /t/ together to make a word? J. It says at, like at school.
d. From word to larger word	E. What do these letters make? (3 cards with letters c,a,b, arranged in that order.) A. Cab? E. Do you know what cab is? A. No, but I know what a cabbage is.
e. From word to sentence	E. What does this say? (3 cards with letters f,a,t, arranged in that order.) A. Fat. My friend is fat.
f. From word to definition	E. What is this? (3 cards with letters b,a,t, arranged in that order.) J. It's bat. It's not one of those things you hit. It's the bat that flies around.
2. Association to experience.	E. What do you know how to write? J. I can write cat. E. That's one of your favorites, right? J. Yes, 'cause we have two cats at home.
	E. What is this (m,a,t)? A. Mat -- a rubber mat. I remember that in pre-school, my brother fell on one.

Types of Elaboration	Responses
3. Evaluation of the "sense" of the written information.	E. Can you make a word with these letters (c,t,a)? A. (Puts together c-t-a) That's /cta/. It doesn't make sense.
	E. What is this (b,a,t)? A. That says bat and that makes sense!
4. Evaluation of the accuracy of the written information.	E. What does this sentence say? (The bag is big.) (Sentence strip) A. The bag is big. Bags are small.
	E. Read the title of this story. (Alex Can Read) A. Alex can read. You should change it to "Alex can't read."
	E. Read this sentence. (The cat is fast.) (Sentence strip) A. The cat is fast. Cats aren't fast. Dogs are fast. Cats are fast only in an emergency.
	E. Can you read this? (Is the cat fat?) (Reads silently) Yes, he is very fat. There's a cat so a mouse has to come.

The Uncertain Path in the Acquisition of Knowledge

Within each presentation mode there were specific requirements. In the P-W mode, Alex and Jennifer were required to remember a set of phonographeme correspondences, and the order in which they were to be blended. In the W-P mode, Theresa and Paul were to remember a list of words.

The design of the project initially called for one item to be presented until the child knew it and was able to demonstrate this knowledge and memory under several different conditions. Then the next word or phonographeme was to be presented. The present-test -- present-test format involved a short-term criterion of knowing. This became a problem when it appeared that what was known on one test occasion one day was not known on another test occasion on a later day. This raised the question: When can a piece of information be considered to have been known once and later forgotten and when was it never truly known?

The children's responses to the learning of "bat" present an example. Paul's confusions are illustrative. On 12/3 he was presented with the word bat. He was able to discriminate it from cat, and also to pick it out of a string of three-letter words all composed of b,t,a. On 1/9 he was presented with big, and he was still able to recognize bat, though he was unable to decode the unknown words: bag, bad, and ban. On 1/10 he was given the sentence, "The cat is big" and he read, "The cat is bat." However, on 1/21 and 1/23 he was able to distinguish big and bat when the words were presented individually or in sentences. Further, on 1/23 when he was presented with bag, he evidenced no confusion between big, bat, and bag. However, on 1/28 when he was asked to point out bat in a group of words, he pointed to bag. When questioned about the word bag, he was able to identify it correctly. Again on 2/4 when shown bag, he incorrectly identified it as bat. When questioned, he changed his response to big. That same day when shown bat, he correctly identified it. This appears to indicate an instability in his knowledge of the word bat, even though he frequently and correctly identified the word. His spontaneous comments revealed that he frequently relied upon first-letter clues when identifying

a word. His confusions in this example are all due to the common first consonant b. However, this raises the question: Is the word bat known when the child uses only a predominately first-letter clue? This may be an example not of incomplete knowledge but of the way in which an insufficient strategy occasionally leads to faulty conclusions.

Theresa also showed some confusions in her knowledge of the word bat. On 12/3 when Theresa was first presented with bat, her behavior followed this sequence:[1] Identifies bat correctly twice; shown bat and miscalls it cat (laughs); corrects herself but makes same mistake a few minutes later; identifies bat correctly four more times; is shown tab and miscalls it bat; identifies bat three times correctly. On 12/5 she identified bat correctly. On 12/10 she identified bat correctly three times, distinguished bat from tab, identified bat in the matrix: bat, ban, bad, bag, and in the matrix: cat, rat, bat, hat, fat. On 1/7 she correctly identified bat four times, was shown "a fat bat" and she read, "a bat hat." Later that day she read "a fat bat" correctly and assembled bat from b,t,a. For the next three months, in the majority of cases she correctly identified bat under a variety of conditions. However, her fat-bat and tab-bat confusion persisted and several new confusions were introduced during the next 10 sessions as she received new words: pat - bat (once), bad - bat (twice), dig - bat (once), bag - bat (five times). In these examples she rarely ever called bat anything but bat; however, she called a variety of other words bat. It seems clear that in the case of bad and bag she was relying

[1] It is important to note that the behaviors to be listed do not follow immediately after one another but are interspersed with conversation, writing and work with other materials.

on the first-letter clue b, and as in Paul's case this strategy was insufficient. In the case of pet and dig the two initial consonants are often confused with b. Theresa gave ample evidence of a directionality confusion throughout the year. Typical of her were comments such as, "bat -- that p is upside down" or, "what does this say ("a cat" turned upside down) now?" It would appear that she, like Paul, was applying a first-letter strategy, but that in her case its application was confounded by a directionality confusion.

Discussion

The initial trial year of the Decoding Strategies Project, while mainly intended to provide for the testing of materials and procedures, also yielded insights into the way children approach the reading task and raised interesting questions for further exploration. What follows is a brief discussion of the insights gleaned from the first year's efforts and of the questions for further research which grow out of them.

The view of the child as learner which emerged from our work is of an active individual, trying to impose structure upon and elicit meaning from the tasks to which he is exposed. This is a different view from one which sees the child as passively acquiring a body of information and learning a set of procedures by which to deal with the information. Even five-year olds are not naive beginners in learning to read. They all bring to the reading task both a set of understandings and "rules" for dealing with information in general, and a set of expectations, preconceptions and beliefs specific to the reading task. The particulars, however, vary with the individual child's experience and personal style.

The Quest for Meaning

It seems safe to say that most children approach the reading task with the expectation that once they have "broken the code," so to speak, the resulting information will take the form of natural language. This was true of all four children in the study, though to varying degrees and appearing in idiosyncratic ways. For example, reading a nonsense word, even when the child created it himself by arranging letters, resulted either in dissatisfaction or amusement. "It doesn't make sense" was one child's way of saying that the outcome of decoding failed to fulfill the expectation that natural language would result. Even when "reading" produced real but unfamiliar words, we saw one child transform them into meaningful units (tac into tackle or cab into cabbage).

Not only did the children expect their decoding or recognition efforts to translate into natural language; for some of them the content also had to be "true." A sentence composed of perfectly good, understandable English words which from the child's point of view provided misinformation was also met with rejection or humor.

One might, therefore, advance the hypothesis that even in the earliest phases of learning to read, decoding and comprehension are not separable in most children's minds. Children agree to learn and play the decoding game because of the implicit promise that meaningful information will result.

If this is generally the case, then a further hypothesis may be worth testing: children who approach the reading task without a belief in the implicit promise that printed symbols, once decoded, will yield information in their natural language will have greater difficulty in the early phases of reading instruction than children who grasp the relation-

ship between the printed symbols and natural language.

Grasping this relationship enables the child not only to anticipate the meaningful outcome of his own decoding efforts, but also opens up the possibility of encoding. Three of the children frequently asked the examiner to write words which they "liked" or wanted to read, thus recognizing that they were dealing with a reversible process, going from symbols to language and from language to symbols.

If, indeed, a belief in the "promise of meaning" is a necessary condition for successful achievement in early reading, it would be interesting to investigate how a child develops this belief. It may well be that one of the reasons why children who come from homes in which people read to them and where they can handle books become successful readers is that these experiences teach them to associate print with language and to develop the expectation that when they learn to "read," they, too, will derive meaning from the printed page. Whether the promise is inferred by the child from his experiences or whether it needs to be made explicit by the adults with whom he engages in "reading" activities, remains to be investigated.

Should this belief in a meaningful relationship between print and language emerge as an important ingredient of successful early reading, the school may need to identify whether and in what form it exists. Where it is absent or uncertain, the school might engage in special efforts to help the child internalize a belief in the relationship. Such procedures would have to be sensitive to the forms of a child's natural language, especially where the spoken dialect differs from what emerges from the printed page, otherwise the implicit promise will be broken and

the child will lose faith in the enterprise.

The apparent "quest for meaning" consistently observed among the four children in this study also raises questions about the nature of the material to which beginning readers should be exposed. There is ample evidence to support the importance of stressing decoding skills in early instruction. However, the use of nonsense words which fall naturally into the various matrices through which decoding is frequently taught, may need to be reconsidered. Perhaps it takes a greater sophistication than the beginning reader has to accept the legitimacy of playing the decoding game with words which are not a part of their natural language. When the child has decoded a word which has meaning, he experiences a kind of "Eureka" sensation which may act as a criterion for checking his accuracy and, if correct, a form of reinforcement. When his efforts result in a meaningless unit, he may be left without a sense of closure since he has no standard against which to assess his own production. As he matures in his decoding skills and is reinforced in his belief that his efforts will produce linguistic meaning, he may be ready to recognize and accept the fact that not all combinations of printed symbols translate to meaning and, that, indeed, some combinations cannot even be converted into English phonology.

Other Beliefs Related to Reading

Unlike the common belief in the necessary correspondence between the printed symbols and meaningful language, the children brought with them a series of idiosyncratic beliefs about the reading enterprise which, while often "logical" were inappropriate. One might hypothesize that holding on to inappropriate beliefs in the face of contrary evidence or direct

instruction, will lead to reading difficulty.

Children's confusions among letters which have similar characteristics but differ in orientation (b,d,p,q) have been observed in many studies and noted by reading teachers. But the confusion has generally been attributed to perceptual difficulties, i.e. faulty discrimination abilities, and for some children this is indeed, the case. In some cases, the miscalling of letters may be due to a lack of memory for the correct label. However, insistence on calling b,d,p and q by the same name, even when the child was able to discriminate among them without difficulty (and knew the names "people" gave them) suggests that the "error" was not perceptual but may have resulted from applying cognitive "rules" derived from previous non-reading experiences. Children learn early that objects have names and these remain constant no matter what the orientation of the object. Thus, facing a doll or a truck to the right or the left, or turning them upside down, does not change their names. If printed symbols are viewed as objects, which seemed to be the case for these children, then shifting the orientation should have no effect on the label. This expectation seemed implicit in one child's deliberate decision to call b,d, p and q by the name p, and in the consistent fashion in which the 12 children who took the pretest called b and d, b, and p and q, p. This latter finding suggests that five-year olds are more apt to recognize up-down variations as warranting label changes than right-left variations. However, one of the children on the pretest who labeled g correctly then turned the letter upside down and called it a 6.

Thus, the importance of orientation for deciding on letter names and, consequently, on corresponding sounds requires learning that the rules

that hold for other objects in the environment don't necessarily hold for letters. Once the child learns that orientation is a significant feature in reading, this knowledge may become overgeneralized. He now applies the new rules not only by attributing different labels and sound equivalents to symbols in different orientations, but to different meanings as well. This was evidenced when one of the children volunteered the information that he could write "up," did so correctly, and then said he could also write "down" and proceeded to write "pu." This behavior combined the learned significance of orientation and the belief that meaning and word form should have some correspondence.

While for some children orientation confusion appeared to result from the logical misapplication of previously appropriate rules, for others it may have resulted from difficulty in remembering the appropriate label and/or sound associated with each of the symbols. Once Paul accepted the fact that the orientation of letter symbols creates different "objects" with different names and sounds, he made no further errors due to symbol confusion. For example, once he learned the word "bat," he never miscalled it. However, he would read other words which began with b as "bat." On the other hand, Theresa, who generally read "bat" correctly, also read "pat" and "dig" as "bat."

How often and how tenaciously are such and other inappropriate beliefs and conceptions held by young children? Are such "logical" extensions from non-reading experiences to the reading task more often evidenced by brighter than by less bright children? Do the less bright or less articulate children also bring "logical" beliefs to the task of a less sophisticated nature? For example, on the pretest one child's response to the question, "How does cat begin?" was "mieow."

It is probable that most children give up inappropriate beliefs as they become clearer about the rules of the reading task. One wonders

to what extent retaining such beliefs may not underlie some children's reading difficulties? This is a question well worth exploring in future research.

The Effects of Learning Styles

Although there were common motifs in the way the four children approached the reading task, the specific modes were quite idiosyncratic. Not only did each child seek meaning in his/her own way and demonstrate quite individual beliefs about the task, but the children also differed in their ability to master the material in the treatment to which they were assigned. In the part-to-whole treatment, the two children were at opposite ends in their ability to put phonemes together into words, i.e. to blend. Alex, from the beginning, sounded out each letter and, at once, proceeded to say the word. Presented with bat he would say, "/b/ /a/ /t/ bat." However, he had considerable difficulty learning the sight words "the" and "is" since they were presented not for sounding out but for direct recognition. In fact, when a word which he had previously decoded was exposed briefly, he had difficulty in recognizing it. Alex was a natural decoder and, perhaps, because the task came so easily to him, he did not bother to use any visual cues to help with recognition. Jennifer, on the other hand, while she could "sound out" the individual phonemes, could not blend. She could, however, recognize any word which she had been told or which she "figured out" after great labor. Once she knew what to call a letter configuration it became "hers" and she could recognize it correctly or, if told the word, encode it. In fact, she showed remarkable encoding ability, far greater than her ability to decode.

The experience with these two children who had been presented with the same materials and initially instructed in the same way, raised questions as to the relationship between a child's "natural" bent and the optimum mode of instruction. It is not possible to determine whether Jennifer would have arrived at a decoding strategy had she been exposed to whole words, allowing the energy which was futilely expended on trying to blend to be used in amassing a larger sight vocabulary. But she would certainly have felt more successful. In fact, she herself forced a modification in the mode of instruction by adopting a whole-word learning strategy. While all children have to develop some skills for decoding if they are to become adequate readers, it is possible that for some children a period of sight learning is necessary before introducing graphophonemic information, while for others, such an approach would impede rather than enhance learning.

Do these findings suggest that there are two major ways in which children can learn to transform configurations of printed symbols into language and that one or another of the ways is more efficient for a given child? Or, are there some children who would benefit from a combination of the two approaches, either simultaneously or in some alternating sequence? Would a child, if given access both to phonographemic information and to learning sight words, find and adopt the most comfortable approach? These questions can be examined within the general format set for the Early Decoding Strategies Project by adding a "free choice" approach to the part-whole and whole-part approaches used thus far.

The Use of i/t/a in Research on Early Reading

The use of i/t/a was an essential feature of the project. Only through i/t/a was it possible to present the same content in the two modes and thus vary only the approach. Furthermore, it made possible the introduction of many more meaningful words within a spelling pattern than would have been possible in t.o. This was especially true for the symbol cc which allowed for the inclusion of words normally spelled with ea, ee, e - e or ie.

In general, the children accepted the use of i/t/a even though most of them recognized that the words they read frequently looked different than those their older siblings or parents read. One of the children articulated this difference explicitly when he explained during the pretest that he and his brother in first grade were learning i/t/a but his big brother (in third grade) was learning t.o. Two of the children, who consistently asked for "words to take home" to show their mothers, asked that the words be written both "the way we read them in school" and the way their mothers read them.

Thus, the children recognized and accepted the differences between the way their words looked and the way "grown-up" words looked and were not confused by this fact.

However, some of the specifics of i/t/a did lead to confusions. All four of the children came with prior knowledge of the spelling of their own names and of the names of the capital letters and at least some of the lower case letters of the traditional alphabet. As they began to use i/t/a some of the symbols caused problems, especially the ɑ (as opposed to ɑ) and the ɤ . For example, when asked to assemble her name from felt i/t/a letters, Theresa put together "Theres," and said "I think

there is more missing." She would not pick up the ə nor accept an A, but said, "I need one of these" printing to the ɑ she had written for her name. The ƨ gave a number of the children trouble, especially those who could read the word "is." Since in English words, the voicing or lack of voicing of the final s is involuntary, there seemed little purpose in retaining the ƨ symbol.

Confusion was also noted when the symbol ɛɛ was introduced. Since the children already associated names with letters, and the name ɛ was already "used up" by the letter e, they wanted to find a name for ɛɛ. Paul called them "threes backward." The confusion between letter name and letter sound for the symbols e and ɛɛ may have led Paul to the notion that letter names could be blended to yield a word. For example, when presented with nɛɛ, he read "any" and explained that the word "has an n (en) and two e's."

In sum, the use of i/t/a was essential to the execution of the project. The children recognized and accepted that it was different from what adults read. The few confusions which were noted in the limited amount of information presented, were fairly readily adjusted, except for the use of the symbol ƨ which was eliminated. It is probable that additional confusions will arise as children are exposed to additional "nameless" letters or to new forms of symbols with which they may be familiar in t.o. form. But, like those already encountered, they, too may well be short-lived.

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